Observations and Results:

Table 1:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **R1(Ω)** | **Ammeter Reading (A)** | **Voltmeter Reading (V)** |
| 100Ω | 0.042A | 4.2V |
| **Tolerance (%)** | +5 |

Table 2:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **R1(Ω)** | **R2(Ω)** | **Ammeter Reading (A)** | **Voltmeter Reading (V)** |
| 100Ω | 68Ω | 0.028A | 4.4V |
| **Tolerance (%)** | +5 | +10 |

Table 3:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **R1(Ω)** | **R2(Ω)** | **R3(Ω)** | **Ammeter Reading (A)** | **Voltmeter Reading (V)** | | | |
| 100Ω | 68Ω | 82Ω | 0.0175A | V1, 2, 3 | V1 | V2 | V3 |
| **Tolerance (%)** | +5 | +10 | +15 | 4.2V | 1.68V | 1.15V | 1.35V |

Analysis Questions:

1. In Table 1 my measured value for R1 is the same as the printed value, which was 100Ω, which gives a percent error of 0%.
2. For Table 2 my measured value was 164Ω, and the printed value is 168Ω, which is a difference of 4Ω and a percent error of 2.4%.
3. For Table 3, my measured value was 240Ω where as my printed value is 250Ω, leaving a difference of 10Ω, a percent error of 4.00%.
4. When a circuit consists of resistors in series, the equivalent resistance is determined by adding all the separate resistances. (Rtotal= R1+R2+R3...).
5. In a series circuit, the total voltage drop is equal to the sum of all the other voltages throughout the circuit. (Vtotal=V1+V2+V3...).
6. In a series circuit, the current is constant. (I1=I2=I3...).

Conclusion:

In conclusion, the resistance in a series circuit trial 1 is 100Ω, trial 2 is 164Ω and trial 3 is 240Ω. My percent error for trial 1 is 0%, trial 2 is 2.4% and trial 3 is 4.0%. Reasons for these errors would be miscalculation due to the apparatus because a lot of calculations were approximate values of the scales.

Observations and Results:

Table 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Resister | Printed Value of Resister (Ω) | Tolerance Range (+ / - %) | Voltage (V) | Current (mA) | Current (A) | Resistance  (Ω) |
| R1 | 100Ω | +5 | 4.2V | 42mA | 0.042A | 100Ω |
| +5 | 5.8V | 60mA | 0.060A | 96.7Ω |
| R2 | 68Ω | +5 | 4.2V | 61mA | 0.061A | 68.9Ω |
| +5 | 5.6V | 80.1mA | 0.088A | 69.1Ω |
| R3 | 82Ω | +5 | 4.1V | 50mA | 0.050A | 82Ω |
| +5 | 5.7V | 69mA | 0.069A | 82.6Ω |

Analysis Questions:

1. Values found in data table 1, calculations are attached at the end of this lab.
2. The average for R1 from the numbers I have calculated is 98.35Ω and the printed value is 100Ω. The error difference is -1.67%. For R2, I calculated an average of 67.5Ω and the printed value is 68Ω, leaving me a percent error of -0.74%. For R3, I calculated an average of 82.3Ω and the printed value is 82Ω, leaving me a percent difference of 1.46%
3. All of my values are within the tolerance range.
4. An ammeter’s proper placement in a circuit is attached to the voltage source at one end and attached to a resistor at the other.
5. A voltmeter’s proper placement in a circuit is attached to the inside of the resistor at both ends.
6. The current running through this circuit is constant; each part of the circuit gets the same amount of amperes from the current (I1=I2=I3...). The voltage drop is equal to the sum of all other voltages in the circuit (Vtotal=V1+V 2+V3...). The resistance of this circuit has the same relationship as the voltage, the sum of all resistors is equal to the equivalent resistance (Rtotal=R1+R2+R3...).

Conclusion:

In conclusion, we applied Ohm’s law to determine the values of three resistors. We did this by setting up an apparatus for all three resistors and reading the ammeter and voltmeter to get values. We applied these values into Ohm’s law (V=IR) to determine if it does in fact equal our initial resistance. We took two values for each and made an average to compare it to the expected value. For the 100Ω resistor there was a percent error of -1.67. For the 68Ω resistor there was a percent error of -0.74% and for the 82Ω resistor there was a percent error of 1.46%, all within the tolerance level of +/- 5%. Reasons for my error percentages would mostly be due to incorrect readings from the scales, as they were not very precise and a lot of values depended on approximation.

Sample calculations:

Sample Calculations:

Purpose: Use Ohm’s law to determine the values of resistors.

Theory: Ohm’s law states that V=IR, where V is the potential difference in volts, I is the current in amperes and R is the resistance in Ohms. Ohm’s law states that the electric current, flowing in a circuit is directly proportional to the applied voltage, and inversely proportional to the resistance.

Materials: Please refer to the lab script “22.1 Ohm’s Law” Page 149 in the Physics – Principles and Problems- textbook.

Procedure: Please refer to the lab script “22.1 Ohm’s Law” Page 149-150 in the Physics – Principles and Problems – textbook.

Ohm’s Law

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Mrs. Watson Physics 122

Friday, February 29, 2008

Series Resistance

By:

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Friday, February 29, 2008

Purpose: investigate resistance and determine the equivalent resistance of resistances in series.

Theory: In a series circuit, I is the current in amperes (A) and it is constant. Equivalent resistance, Req in ohms (Ω) is the sum of all resistors, and the potential difference (V) is the sum of all voltage drops across each resistor. Ohms law uses the formula V=IR to help us find the current, resistance and potential difference in a series circuit.

Materials: Please refer to the lab script “23.1 Series Resistance” Page 157 in the Physics – Principles and Problems – textbook.

Procedure: Please refer to the lab script “23.1 Series Resistance” Page 157 in the Physics – Principles and Problems – textbook.